



[4910-13-P]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2019-0683; Project Identifier AD-2020-00149-E; Amendment 39-21149; AD 2020-13-04]**

**RIN 2120-AA64**

**Airworthiness Directives; General Electric Company Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FAA is superseding Airworthiness Directive (AD) 2017-09-06 for all General Electric Company (GE) GENx-1B and GENx-2B model turbofan engines. AD 2017-09-06 required updating electronic engine control (EEC) full authority digital electronic control (FADEC) software on GENx-1B and GENx-2B turbofan engines and replacing a certain fan hub frame assembly part installed on GENx-2B turbofan engines. This AD requires updating EEC software on GENx-1B and GENx-2B engines and replacing a certain fan hub frame assembly part installed on GENx-2B engines. This AD was prompted by the development of a design change by GE to remove the unsafe condition. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact General Electric Company, GE Aviation, Room 285, 1 Neumann Way, Cincinnati, OH 45215; phone: 513-552-3272; email: [geae.aoc@ge.com](mailto:geae.aoc@ge.com). You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA, 01803. For information on the availability of this material at

the FAA, call 781-238-7759. It is also available on the Internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2019-0683.

### **Examining the AD Docket**

You may examine the AD docket on the Internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2019-0683; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the regulatory evaluation, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Mehdi Lamnyi, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA, 01803; phone: (781) 238-7743; fax: (781) 238-7199; email: [Mehdi.Lamnyi@faa.gov](mailto:Mehdi.Lamnyi@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Discussion**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2017-09-06, Amendment 39-18868 (82 FR 21111, May 5, 2017), (“AD 2017-09-06”). AD 2017-09-06 applied to all GE GENx-1B and GENx-2B model turbofan engines. The NPRM published in the Federal Register on November 19, 2019 (84 FR 63820). The NPRM was prompted by the development of a design change by GE to remove the unsafe condition. The NPRM proposed to require updating EEC FADEC software on GENx-1B and GENx-2B model turbofan engines and replacing a certain fan hub frame assembly part installed on GENx-2B model turbofan engines. The FAA is issuing this AD to address the unsafe condition on these products.

## **Comments**

The FAA gave the public the opportunity to participate in developing this final rule. The following presents the comments received on the NPRM and the FAA's response to each comment.

### **Request to Clarify Compliance Time**

The Air Line Pilots Association, International (ALPA), commented that it is unclear why the compliance time to remove the affected fan hub stator assembly booster outlet guide vanes (BOGV) of "before further flight," would occur after an independent engine shop visit. ALPA suggested either removal or clarification of the "before further flight" compliance time requirement.

This AD supersedes AD 2017-09-06 (82 FR 21111, May 5, 2017), which specified removal of certain fan hub stator assembly BOGV at the next engine shop visit after its effective date (June 9, 2017). This AD retains the requirement to remove the fan hub stator assembly BOGV at the next engine shop visit after June 9, 2017, the effective date of the superseded AD, but adds the option of compliance "or before further flight, whichever occurs later." This added compliance time option provides operators that have yet to comply with AD 2017-09-06 the option to comply with this AD, averting a situation wherein operators may be in violation of this AD upon its publication.

### **Request to Extend Compliance Time**

American Airlines (American) requested that the compliance time be extended from 120 days to 180 days for removal of the affected EEC software. American noted that there is a concurrent requirement in Boeing Service Bulletin B787-73-0051, Issue 001, dated July 9, 2019, to update the software for the Loadable Diagnostic Information (LDI) on some configurations of B787 model airplanes. American indicated that the EEC software that supersedes version B195 will not properly function without the LDI update on those aircraft. Accomplishment of the LDI update requires an additional three work

hours, bringing the total to four work hours, during which the Boeing Service Bulletin (SB) instructs that no other maintenance tasks be performed. American commented that extending the compliance time will allow operators to better accommodate for these requirements for the out of service time.

The FAA disagrees. Based on information received by the FAA, the EEC software, version B200 or later, will provide the Ice Crystals Icing (ICI) mitigation logic regardless of whether the LDI software is installed. The LDI update is not required to address the unsafe condition. The FAA did not change this AD.

#### **Request to Add Terminating Action**

American and Japan Airlines (JAL) commented that since this AD is replacing AD 2017-09-06, which includes a terminating action for paragraphs (g) and (i) of AD 2013-24-01 (78 FR 70851; November 27, 2013) (“AD 2013-24-01”), the referenced terminating action should also be included in this AD. American noted that updating the EEC software removes the unsafe icing condition identified in the AD.

The FAA agrees that updating the EEC FADEC software on the affected engines removes the unsafe condition. The FAA disagrees with adding a terminating action to this AD. Since the issuance of FAA AD 2017-09-06, the FAA has approved alternative methods of compliance (AMOCs) to paragraphs (g) and (h) of AD 2013-24-01 for Boeing model 747-8 airplanes, powered by GENx-1B model engines, and for Boeing model 747-8 and 747-8F airplanes, powered by GENx-2B model engines. These AMOCs replaced the need for the terminating action previously included in AD 2017-19-06.

#### **Request to Clarify Compliance Language**

American commented that previous ADs involving EEC FADEC software have required operators to “remove [EEC FADEC] software, version B195 or earlier from the engine and from service.” Previously published ADs also stated, “...do not operate any GE GENx- 1B engine with [EEC FADEC] software version B180 [or B175, for earlier

AD] or earlier installed....” Additionally, American indicated the SBs that replace the B195 software do not require removal of earlier software, just the installation of later software. American requested clarification that the proposed AD only forbids operation of software B195 or earlier, without specifying removal of old software. American noted that specifying removal of the software can cause confusion regarding whether deleting software from the File Server Module is also required.

The FAA agrees. This AD does not need to require removal of the previous version of software that is being updated. The FAA has revised the compliance language in paragraph (g)(1) of this AD to require installation of software that is eligible for installation. The FAA also added a definition to this AD, defining software that is eligible for installation.

#### **Request to Clarify Applicability**

JAL noted that paragraph (g)(1) of this AD requires the removal of EEC software, version B195 or earlier, from the engine and from service. JAL asked if “the engine” includes the spare engine or if it means the engine installed on the airplane. JAL noted that paragraph (e)(1) of AD 2017-09-06 says “Thirty days after the effective date of this AD, do no operate any GEnx-1B engine with electronic engine control EEC full authority digital engine control (FADEC) software version B180 or earlier, installed.” JAL commented that even if the EEC software of the spare engine is a version B180, or earlier, JAL could still install the EEC software, version B185, during engine installation and avoid operating the engine with EEC, software version B180 or earlier. JAL indicated that it believes the intent of this NPRM is to avoid operating the engine on aircraft with EEC software, version B195 or earlier. Therefore, JAL believes the installation of EEC software, version B195, on spare engines or spare EECs is acceptable. JAL requested that the FAA clarify the intent of this AD.

The FAA notes that ADs cannot be enforced until the product is operated. Per 14 CFR § 39.7 “Anyone who operates a product that does not meet the requirements of an applicable airworthiness directive is in violation of this section.” The intent of this AD is to prevent operation of any affected engine installed on an aircraft with EEC software, version B195 or earlier. The requirements of this AD do not apply to spare engines and spare EECs. Therefore, no change to this AD is needed.

#### **Request to Include Latest Service Information**

GE Aviation requested that the FAA include a reference to the Revision 1 of GENx-2B SB 72-00241 in the Related Service Information section of this AD. GE indicated the latest revision of this SB adds a repair process for the BOGV.

The FAA agrees with adding the SB reference to the Related Service Information section of this AD to include GENx-2B SB 72-00241 R01, dated July 4, 2019. The FAA is also adding a definition of a part eligible for installation to this AD, which clarifies that the operator may replace the affected BOGV P/N B1316-00720, with a repaired BOGV P/N B1316-06008. The required actions section of this AD mandates removal of the affected BOGV P/N B1316-00720 and replacing it with a part eligible for installation.

#### **Request to Change Definition of Engine Shop Visit**

GE Aviation requested the FAA change the definition of an “engine shop visit” in paragraph (h) of this AD. GE Aviation stated that accomplishment of a top/bottom case removal procedure should be excluded from the definition to allow for an instance where maintenance is required in the high-pressure compressor module but further extensive flange separation is not required, thus resulting in ability to reduce engine maintenance time. Additionally, GE Aviation stated that this procedure is listed as a shop visit definition exception in GE Service Bulletin 72-0000.

The FAA disagrees. The FAA has not received documentation to support any determination regarding the impact on safety by allowing this exception to the definition of a shop visit.

### **Support for the AD**

United Airlines and the Boeing Company commented that they support the proposed rule.

### **Conclusion**

The FAA reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this final rule with the changes described previously and minor editorial changes. The FAA determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM for addressing the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

The FAA also determined that these changes will not increase the economic burden on any operator or increase the scope of this final rule.

### **Related Service Information**

The FAA reviewed GE GENx-1B Service Bulletin (SB) 73-0082 R00, dated July 9, 2019, and GE GENx-2B SB 73-0077 R00, dated October 29, 2018. The service information describes procedures for installation of new EEC software on GENx-1B and GENx-2B model turbofan engines. The FAA also reviewed GE GENx-2B SB 72-0241 R01, dated July 4, 2019. The service information describes removal and installation procedures for the fan hub stator assembly BOGV.

## **Costs of Compliance**

The FAA estimates that this AD affects 110 engines installed on airplanes of U.S. registry. The FAA estimates that 15 engines will require replacement of the fan hub stator assembly BOGV.

The FAA estimates the following costs to comply with this AD:

### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Install EEC software	1 work-hour x \$85 per hour = \$85	\$0	\$85	\$9,350
Replace fan hub stator assembly BOGV	60 work-hours x \$85 per hours = \$5,100	\$387,800	\$392,900	\$5,893,500

## **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency’s authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: “General requirements.” Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.



## **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

## **Adoption of the Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by:

- a. Removing Airworthiness Directive 2017-09-06, Amendment 39-18868 (82 FR 21111, May 5, 2017); and

- b. Adding the following new airworthiness directive (AD):  
2020-13-04 **General Electric Company**: Amendment 39-21149; Docket No. FAA-2019-0683; Project Identifier AD-2020-00149-E.

#### **(a) Effective Date**

This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**(b) Affected ADs**

This AD replaces AD 2017-09-06, Amendment 39-18868 (82 FR 21111, May 5, 2017).

**(c) Applicability**

This AD applies to all General Electric Company (GE) GEnx-1B and GEnx-2B model turbofan engines.

**(d) Subject**

Joint Aircraft System Component (JASC) Code 7600, Engine Controls.

**(e) Unsafe Condition**

This AD was prompted by reports of GEnx-1B and GEnx-2B model turbofan engines experiencing power loss in ice crystal icing conditions. The FAA is issuing this AD to prevent engine failure. The unsafe condition, if not addressed, could result in loss of thrust control and damage to the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Required Actions**

(1) Within 120 days after the effective date of this AD, install electronic engine control (EEC) software that is eligible for installation.

(2) At the next engine shop visit after June 9, 2017 (the effective date of AD 2017-09-06), or before further flight, whichever occurs later, remove from service all GE GEnx-2B67, -2B67B, and -2B67/P fan hub stator assembly booster outlet guide vanes (BOGV), part number (P/N) B1316-00720, and replace with a part eligible for installation.

**(h) Definition**

(1) For the purpose of this AD, an “engine shop visit” is the induction of an engine into the shop for maintenance involving the separation of pairs of major mating engine case flanges, except for the following which do not constitute an engine shop visit:

(i) Separation of engine flanges solely for the purposes of transportation without subsequent maintenance does not constitute an engine shop visit.

(ii) Separation of engine flanges solely for the purpose of replacing the fan or propulsor without subsequent maintenance does not constitute an engine shop visit.

(2) For the purpose of this AD, EEC software that is eligible for installation is:

(i) For GE GENx-1B model turbofan engines, EEC software that is version B200 or later.

(ii) For GENx-2B model turbofan engines, EEC software that is version C090 or later.

(3) For the purpose of this AD, a part eligible for installation is a fan hub stator assembly BOGV which:

(i) Is not P/N B1316-00720; or,

(ii) Was previously a P/N B1316-00720, but has been repaired and modified into P/N B1316-07637.

**(i) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(j) Related Information**

For more information about this AD, contact Mehdi Lamnyi, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA, 01803; phone: (781) 238-7743; fax: (781) 238-7199; email: Mehdi.Lamnyi@faa.gov.

**(k) Material Incorporated by Reference**

None.

Issued on June 12, 2020.

Lance T. Gant, Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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